Snow Coverage Area for the Sierra Nevada –February 1, 2009

The following analysis of **S**now **C**overed **A**rea (SCA) is derived from MODIS (Moderate Resolution Imaging Spectroradiometer) aboard NASA's Terra and Aqua satellites. Data from MODIS are processed to provide a resolution of 500 meters and a fractional SCA product where each pixel can range in value between 0 and 100% (e.g. 50%=50% of the 500 meter pixel is covered by snow) as opposed to the operational binary product that defines a pixel as either snow or snow free. The MODIS SCA product is available on a daily basis, but viewable areas are subject to cloud cover. In addition, tree canopies mask a portion of the SCA and should be viewed accordingly based on the vegetation characteristics of each hydrologic unit and watershed.

This analysis covers the Sierra Nevada and various river basins, with Figure 1 highlighting the SCA over the Sierra Nevada, and Figure 2 showing the daily SCA in various river basins in January 2005 and 2007. Figures 3 (a-e) focuses on the **Feather**, **American, Tuolumne, Merced, and Kaweah** River basins. The years 2007 and 2005 are used to represent the extreme variability that the Sierra's have experienced and provide a current benchmark for comparison. Additional basins will be added throughout the year and upon request.

These data and analysis are made available by the University of California, Merced and University of California, Santa Barbara under *NASA Grant NNG04GC52 (REASoN CAN 'Multi-resolution snow products for the hydrologic sciences')* and *California Department of Water Resources Agreement 4600007954.*

For further information or comments/suggestions please contact Robert Rice (rrice@ucmerced.edu or (209)228-4397).

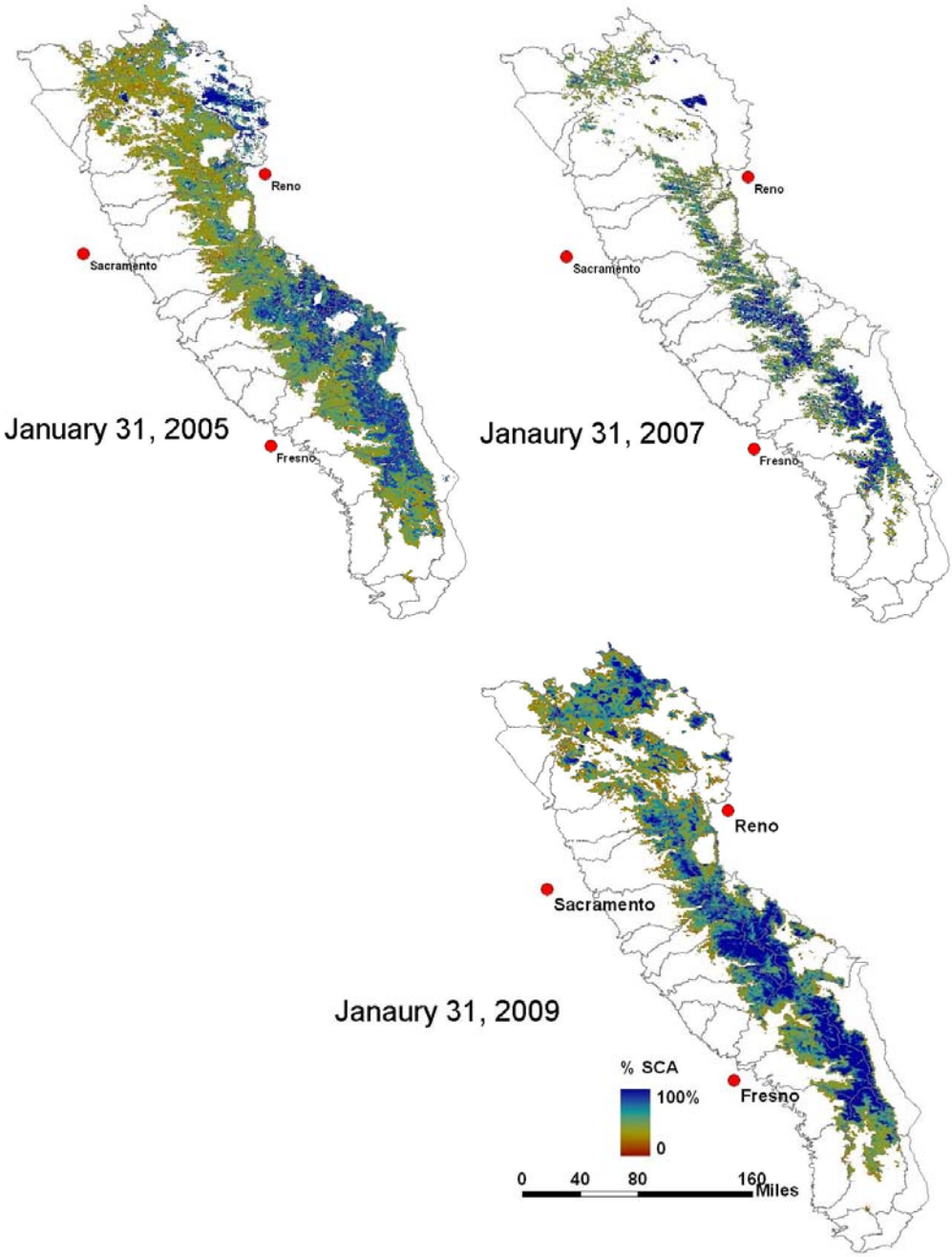


Figure 1. SCA over the **Sierra Nevada** on January 31, 2007/2005 and January, 31 2009 outlined by the individual watersheds. Evident is the extent of snowcover between January 2009 and 2007 in which the statewide snow water equivalent (SWE) on February 1, 2009 was 62% of the historical February 1 average, while the February 1, 2007 was 39% of the February 1 average. On February 1, 2005 the Sierra Nevada was 163% of the February 1 average.

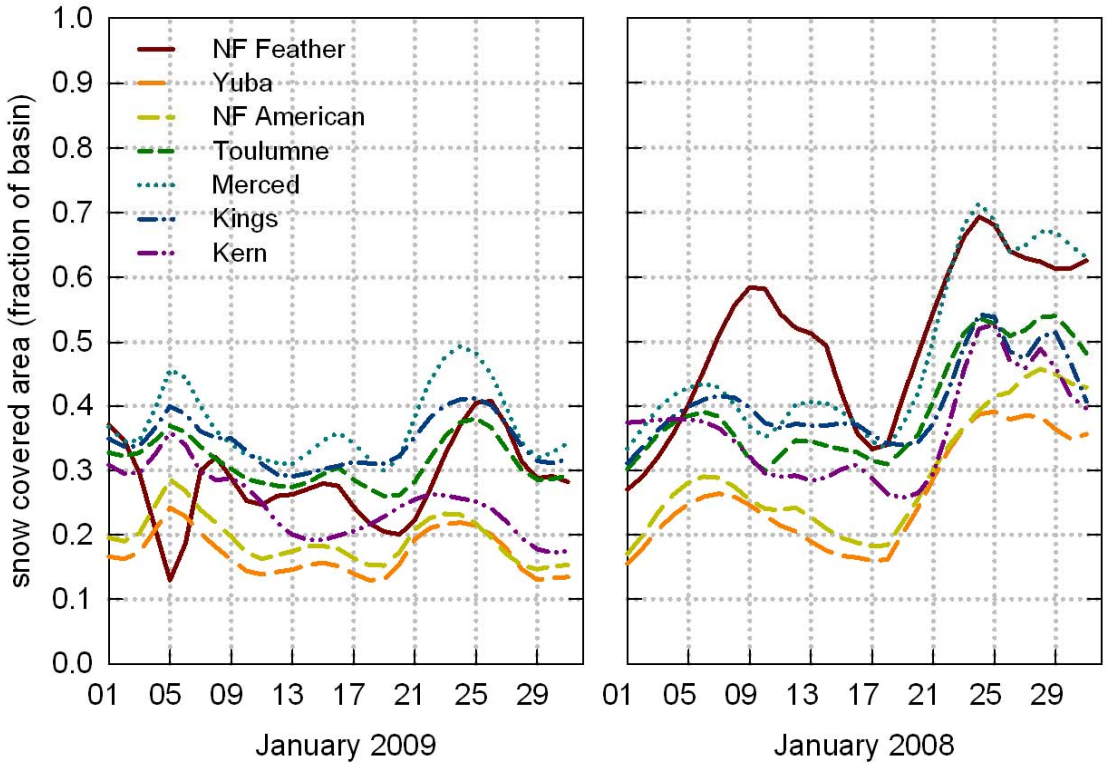
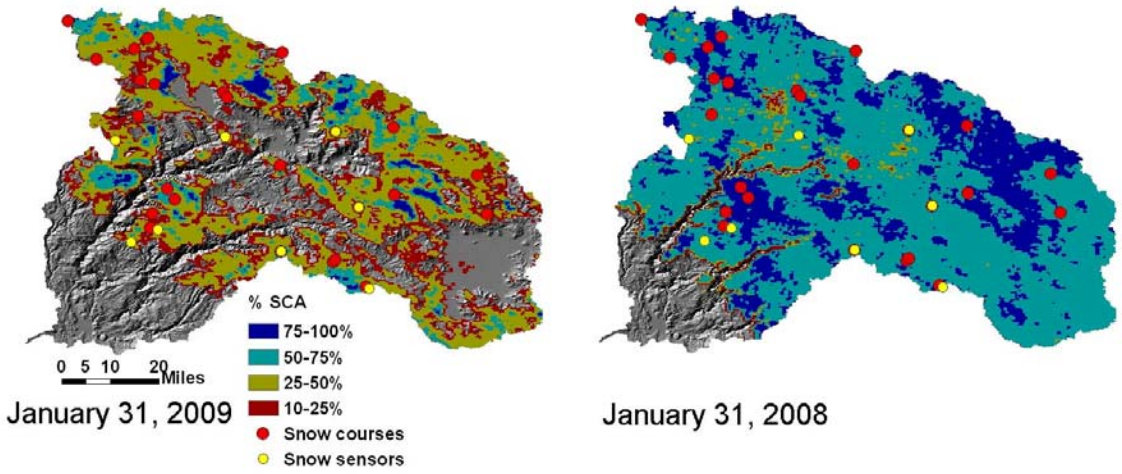
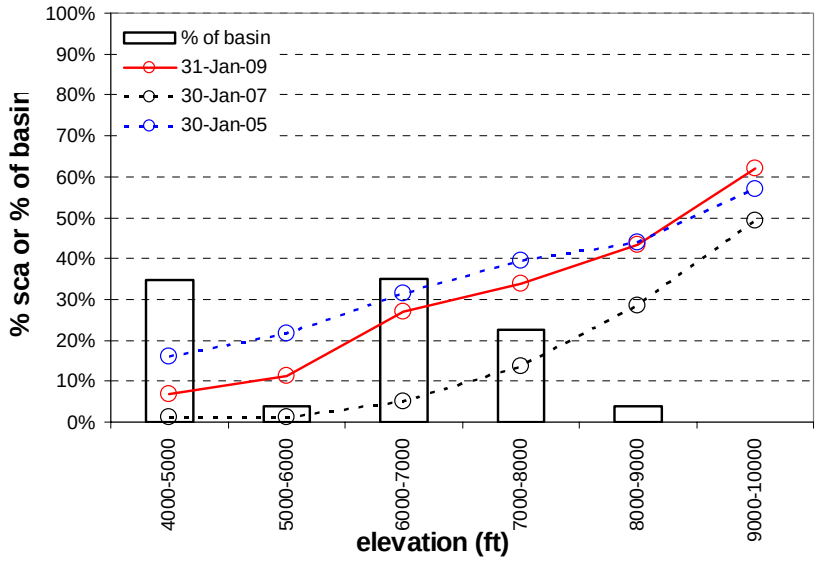


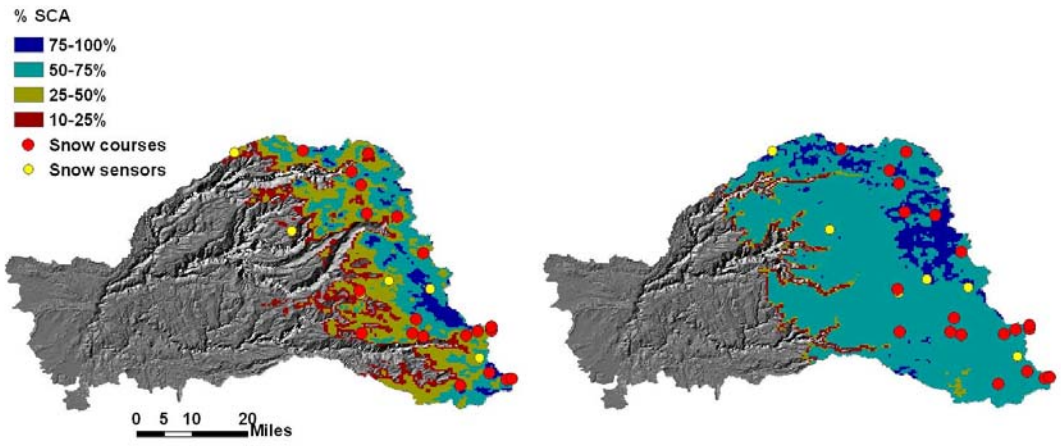
Figure 2. The graphs show the daily January 2009 and 2008 progression of SCA, expressed as a fraction of the basin area (e.g. 0.25 = 25%) in the Sierra Nevada (above the Central Valley) and shows an increase in late January 2008 snow cover area when compared to January 2009 in 8 river basins.

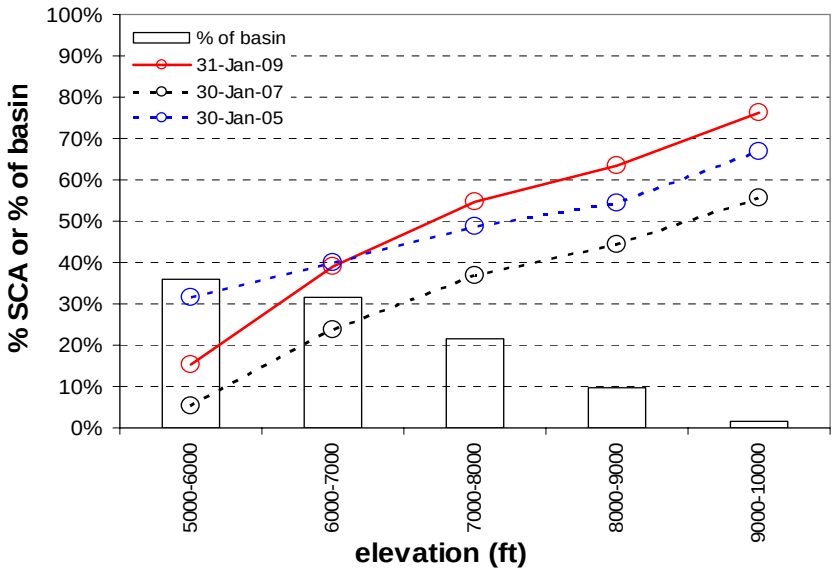




	January 31, 2009	January 30, 2007	January 30, 2005
4000-5000	7%	1%	16%
5000-6000	11%	1%	22%
6000-7000	27%	5%	31%
7000-8000	34%	14%	40%
8000-9000	43%	29%	44%
9000-10000	62%	49%	57%

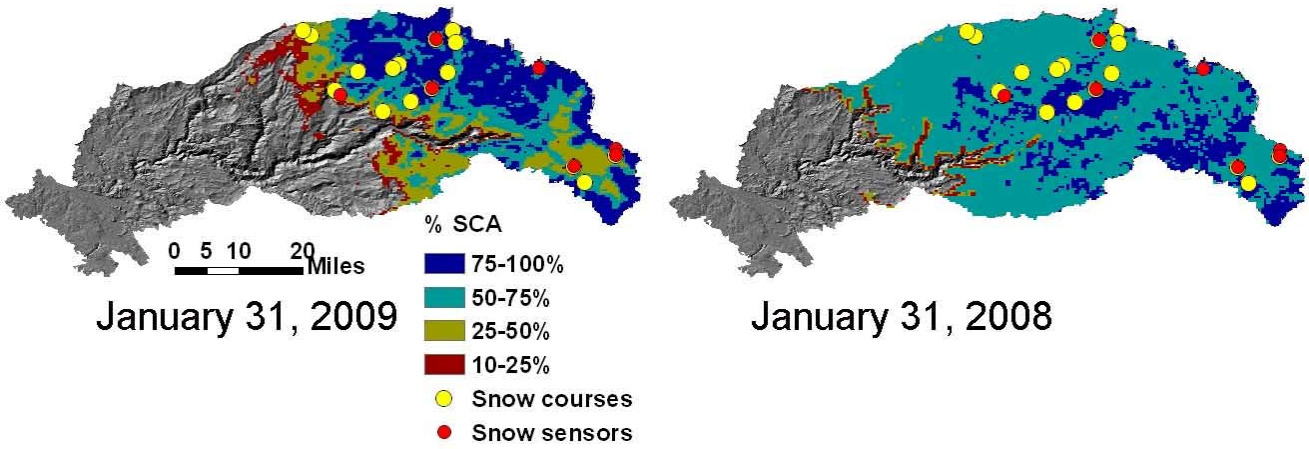
Figure 3(a). SCA over the **Feather River** Basin on January 31, 2009 and 2008. On February 1, 2009 basin-wide SWE was 53% of the February 1 historical average (based on basin-wide snow course data), while February 1, 2007 was 38% of the February 1 average. On February 1, 2005 basin-wide SWE was 128% of the February 1 historical average. Graphical and tabular data represent average % SCA by 1000 foot elevation bands over the **Feather River** Basin for January 31, 2009 and January 30, 2007/2005.

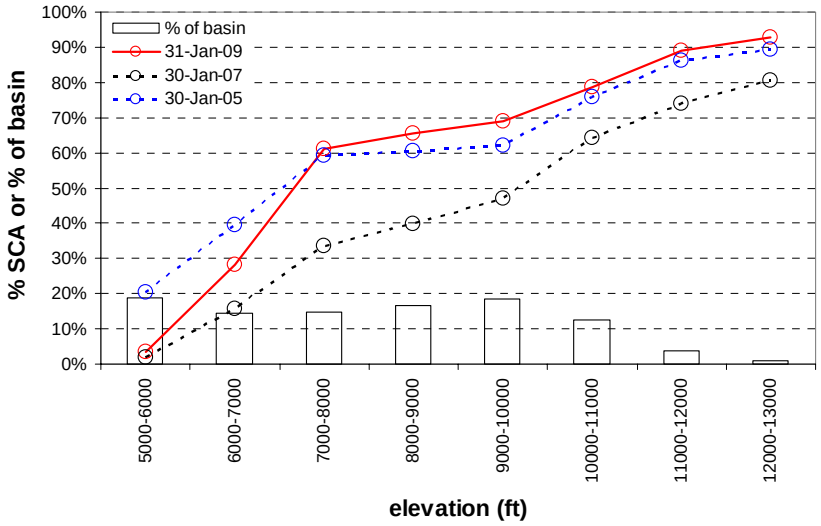




	January 31, 2009	January 30, 2007	January 30, 2005
5000-6000	15%	5%	31%
6000-7000	39%	24%	40%
7000-8000	55%	37%	49%
8000-9000	63%	44%	54%
9000-10000	76%	56%	67%

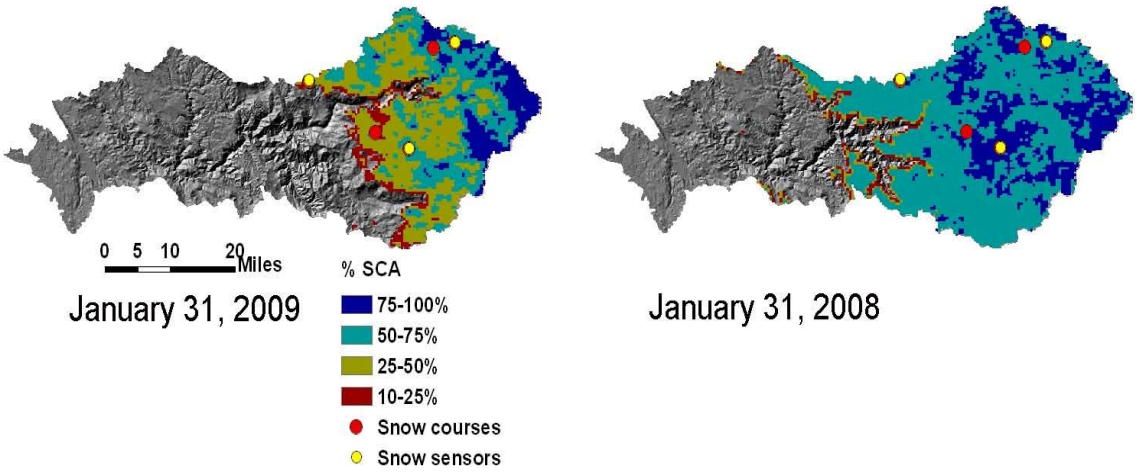
Figure 3(b). SCA over the **American River** Basin on January 31, 2009 and 2008. On February 1, 2009 basin-wide SWE was 70% of the February 1 historical average (based on basin-wide snow course data), while February 1, 2007 was 38% of the February 1 average. On February 1, 2005 basin-wide SWE was 174% of the February 1 historical average. Graphical and tabular data represent average % SCA by 1000 foot elevation bands over the **American River** Basin for January 31, 2009 and January 30, 2007/2005.

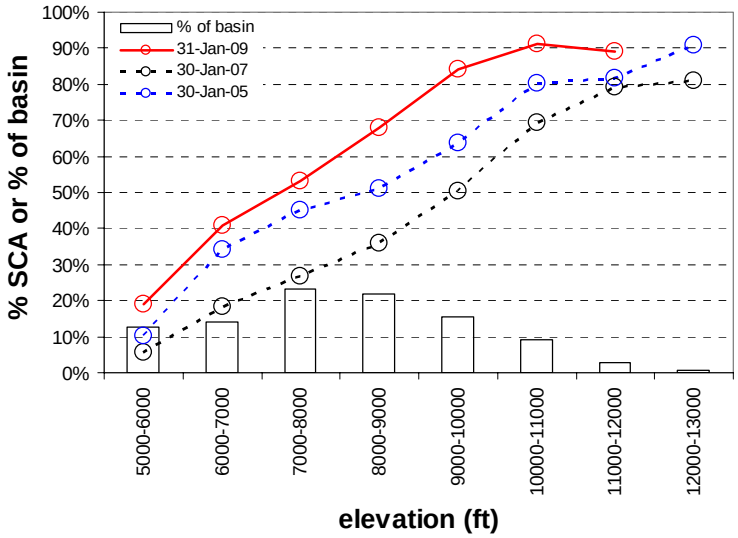




	January 31, 2009	January 30, 2007	January 30, 2005
5000-6000	4%	2%	20%
6000-7000	28%	16%	39%
7000-8000	61%	34%	59%
8000-9000	66%	40%	60%
9000-10000	69%	47%	62%
10000-11000	79%	64%	76%
11000-12000	89%	74%	86%
12000-13000	93%	80%	89%

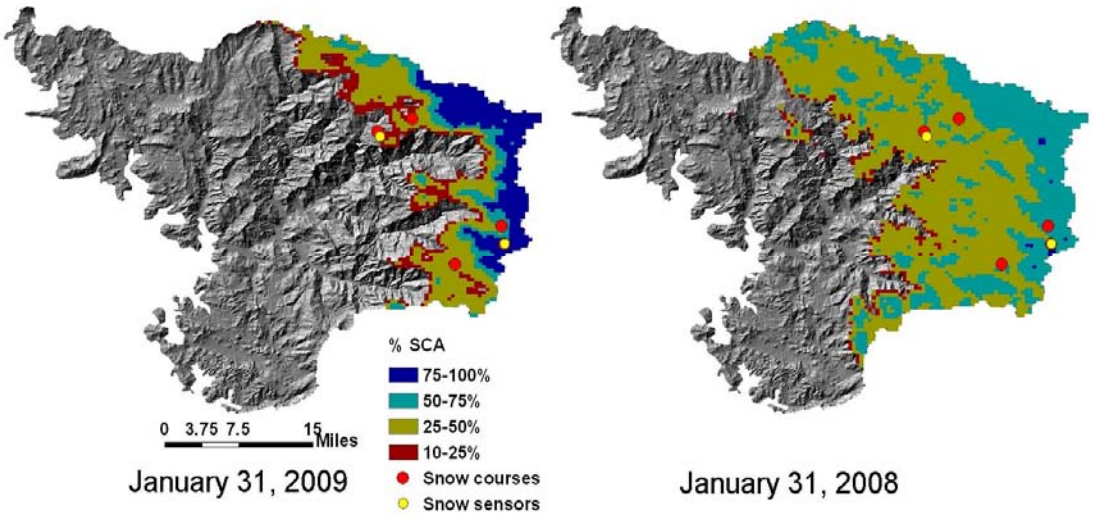
Figure 3(c). SCA over the **Tuolumne River** Basin on January 31, 2009 and 2008. On February 1, 2009 basin-wide SWE was 73% of the February 1 historical average (based on basin-wide snow course data), while February 1, 2007 was 43% of the February 1 average. On February 1, 2005 basin-wide SWE was 180% of the February 1 historical average. Graphical and tabular data represent average % SCA by 1000 foot elevation bands over the **Tuolumne River** Basin for January 31, 2009 and January 30, 2007/2005.

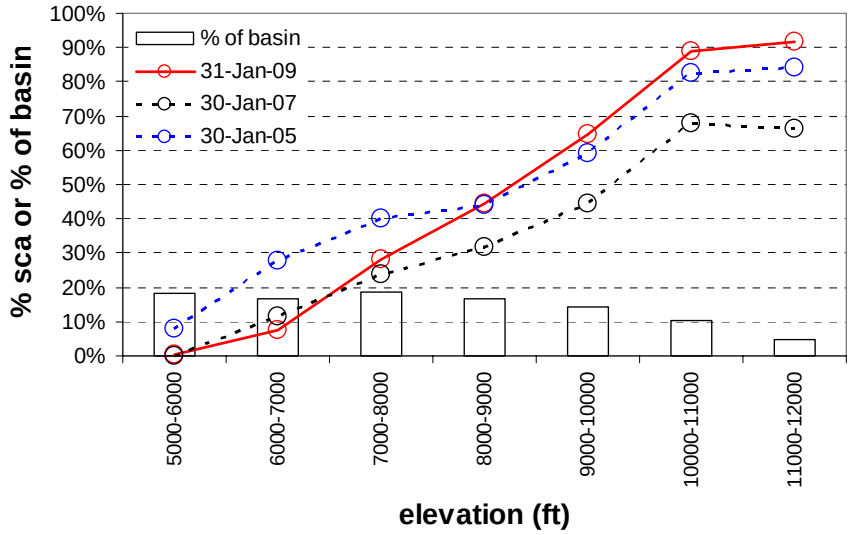




	January 31, 2009	January 30, 2007	January 30, 2005
5000-6000	3%	6%	10%
6000-7000	19%	18%	34%
7000-8000	41%	27%	45%
8000-9000	53%	36%	51%
9000-10000	68%	50%	64%
10000-11000	84%	69%	80%
11000-12000	91%	79%	82%
12000-13000	89%	81%	91%

Figure 3(d). SCA over the **Merced River** Basin on January 31, 2009 and 2008. On February 1, 2009 basin-wide SWE was 67% of the February 1 historical average (based on basin-wide snow course data), while February 1, 2007 was 41% of the February 1 average. On February 1, 2005 basin-wide SWE was 180% of the February 1 historical average. Graphical and tabular data represent average % SCA by 1000 foot elevation bands over the **Merced River** Basin for January 31, 2008 and January 30, 2007/2005.





	January 31, 2008	January 30, 2007	January 30, 2005
5000-6000	0%	0%	8%
6000-7000	8%	11%	28%
7000-8000	28%	24%	40%
8000-9000	44%	32%	44%
9000-10000	65%	44%	59%
10000-11000	89%	68%	83%
11000-12000	92%	66%	84%

Figure 3(e). SCA over the **Kaweah River** Basin on January 31, 2009 and 2008. On February 1, 2009 basin-wide SWE was 79%% of the February 1 historical average (based on basin-wide snow course data), while February 1, 2007 was 43% of the February 1 average. On February 1, 2005 basin-wide SWE was 194% of the February 1 historical average. Graphical and tabular data represent average % SCA by 1000 foot elevation bands over the **Kaweah River** Basin for January 31, 2008 and January 30, 2007/2005.